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PROGRAMED INSTRUCTION.

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THE SOURCES OF CONFUSION INVOLVED IN INITIATING PROGRAMED INSTRUCTION IN THE CLASSROOM ARE LISTED--(1) SPECIALIZED VOCABULARY DEALING WITH THE FIELD, (2) TYPES OF MACHINERY WHICH RANGE FROM THE HIGHLY COMPLEX TO THE VERY SIMPLE, AND (3) DIFFERENT MODES OF PROGRAMING. THE CHARACTERISTICS OF TRUE PROGRAMED FORMATS ARE GIVEN--(1) THE MATERIALS ARE DESIGNED SO THAT A STUDENT SETS HIS OWN RATE OF LEARNING, (2) A STUDENT MUST ACTIVELY INTERACT WITH THE MATERIALS, (3) THE STUDENT'S RESPONSE IS IMMEDIATELY REINFORCED SO THAT HE KNOWS WHETHER HE IS RIGHT OR WRONG, AND (4) THE CONTENT IS INTRODUCED IN SMALL BITS IN THE LINEAR PROGRAM AND IN MEASURED BITS IN THE INTRINSIC PROGRAM. RESEARCH DEALING WITH MANY PHASES OF PROGRAMED LEARNING IS BRIEFLY SUMMARIZED AND A BIBLIOGRAPHY IS APPENDED. THIS ARTICLE IS PUBLISHED IN THE "JOURNAL OF READING," VOLUME 9, NOVEMBER 1965. (MD)

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RESEARCH FOR THE CLASSROOM

Edited By ALBERT J. KINGSTON

PROGRAMED INSTRUCTION

By ALBERT J. KINGSTON AND JAMES A. WASH

Interest in programed instruction continues among educators. Despite the continued interest displayed by various research workers, research regarding the value of auto-instructional techniques in teaching reading at the high school and college levels are scarce.

Confusion is likely to await the classroom teacher who first seeks to explore the area of programed instruction. One source of confusion is the vocabulary employed by specialists in the field. Programed instruction (also spelt programmed), auto-instruction, and programed learning are often employed interchangeably. Sometimes such instruction involves some type of machine ranging anywhere from a highly complex metal devise with electronic controls to a cheap plastic or cardboard box in which the program is housed. At other times the term refers to a book which, to the unsophisticated, may resemble the old-fashioned workbook.

The teacher also shortly discovers that specialists in programed instruction talk about two modes of programing. Linear programs are those in which the content is broken down so that it is presented in small steps or increments, and the student works systematically through all the frames. The other type, labeled intrinsic or "Crowder" type, is described as branching. The intrinsic program provides a choice of responses, and the correctness or incorrectness of a pupil's response determines which frame the student works next. The intrinsic or "Crowder" program also is sometimes described as "scrambled."

Generally four major criteria are employed which represent the *sine qua non* for judging whether materials are programed formats. They are:

1. The materials are so designed that a student sets his own rate of learning.

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2. A student must actively interact with the materials presented in such a way that he responds directly by thought and deed.
3. The student's response is immediately reinforced so that he knows whether he is right or wrong.
4. The content is introduced carefully in small "bits" or increments in the Skinner or linear program and in measured but not necessarily small bits in the Crowder or intrinsic program.

Other writers prefer more elaborate criteria. Fry,[12] for example, lists ten categories in describing programed reading instruction.

Numerous research reports have shown that students learn effectively from self-instructional programs in a number of academic areas.[1, 6, 33, 34]

Other studies have found that it makes no difference whether the students are responding to a scrambled program or a linear program.[7]

In an investigation of programed high school chemistry, Wash[34] found that the relationship between reading grade placement and achievement in a six-week program was not significant. He speculated that the lack of a significant relationship of reading scores and achievement was a by-product of the process of pilot trials to eliminate student error in the development of the program. Tanner[33] confirmed these findings with a similar investigation in mathematics.

Stott[31] demonstrated that reading can be taught through the use of programed instructional formats. Of particular interest was his report that programed reading had distinct advantages in the teaching of adolescents and adults. He reports significant differences in reading achievement between the programed instruction group and the non-programed instruction group at all grade levels in the Bristol, England schools.

Schramm[25] aptly concludes: "This research leaves us no doubt that programs do teach. A great deal of learning seems to take place regardless of the kind of program or level of students."

Evidence has accumulated steadily which shows that elaborate teaching machines are not necessary in order to achieve effective results with programed materials.[7, 28, 29] Goldstein and Gotkin[13] reviewed eight studies which compared programed texts with machines. No significant differences were obtained between pupils using machines and programed texts. Also, it was felt that there was some saving in time where the programed text was used. The writers warned that because programed texts were as effective and efficient as machines, it does not necessarily follow that all programed texts are superior to all teaching machines.

Recently research workers have raised certain important questions which should be of concern to the classroom teachers. Blyth[3] states

that programs should be selected after the teacher weighs them in terms of the objectives of a particular course. Stake[27] asks if the same materials are suitable for all learners. Certainly, classroom teachers should consider such aspects as pupil readiness, reading ability, and motivation in selecting programs. Similarly, such considerations as the student's ability to concentrate, his ability in independent study skills, his need for interaction with the teacher or fellow students are important factors in deciding whether to use self-instructional methods for achieving desired educational goals.

Eigen[7] points out that programed instruction does not necessarily simplify the life of the teacher. Nor is the teacher's role less important. It seems likely, however, that the teacher's role may be changed somewhat from that found in the traditional pupil-teacher relationships. Noal[23] also notes that programed instruction requires a more careful study of the classroom teacher's role in the instructional program.

Although somewhat less attention has been devoted to programed instruction in reading than to some other areas of the curriculum, yet a sufficient number of programs are available to warrant attention. Fry[12] has recently reviewed 16 such programs designed for teaching reading and vocabulary development. This review represents one source of information about available programs; however, a number of additional programs have been published since that time for use with high school, college, and adult groups.

Early programs often focused on the development of sight vocabulary reflecting the then-prevalent whole-word methods of instruction.[30] More recently, however, attention has been given to the development of reading skills in a more encompassing manner.

A number of provocative papers have dealt with the problems of using programed instruction in reading. Carnes[5] discussed the need for investigating the transfer value of programed learning as well as for determining which reading skills may best be adapted to programing. He also suggested that the "novelty effect" caused by using programs in the classroom has not been recognized sufficiently in reported research. This point is well taken. Classroom teachers long have recognized that novel approaches to learning usually have a motivating effect on pupils.

Evidence continues to mount which indicates that programed instructional techniques result in effective improvement of skills in reading as well as such related language abilities as grammar, spelling, and vocabulary.[4, 18, 20, 23, 24, 26]

Just how programs result in learning is not known. Komanski and Sohn[17] suggest that programing teaches important skills by teaching students new words.

A number of experimenters have used programed materials with special groups of students. Beckmeyer[2] concluded that the use of programed materials was feasible with hard-of-hearing students. Falconer[10] also found that a teaching machine was beneficial in teaching a sight vocabulary to young deaf children.

Malpass[19] evaluated two automated teaching procedures in teaching basic word recognition and spelling skills to retarded children. He felt the results indicated that the procedures were effective and suggested that further investigation of the use of automated teaching for use with retardates was indicated. Ellson[9] also found programed instruction effective particularly when combined with regular classroom procedures.

Determining the readability of programed materials is difficult because most of the presently employed readability formulae were not designed for the type of prose commonly contained in programed instructional formats. Grace,[14] however, used the Flesch formula to study sample programed materials and found them simple and easier to read than certain non-programed materials.

In summary, programed instruction has been shown to be an effective tool when properly used in the classroom. It is not designed to replace the classroom teacher, nor can the teacher simply use any available program to accomplish the desired objectives. Rather he must select the program carefully in terms of known characteristics of his students and for achieving specific educational goals. Certainly, research in programed instruction has shown that it has sufficient value so that it merits trials at least as an adjunct to usual classroom procedures. Teachers who are experimentally minded will find that it may serve to help individualize instruction in various components of the language arts. McNeil states: "Although old methods in teaching reading have not been conclusively validated and new ones have scarcely been explored, we believe that with programed instruction the possibilities for improving research in the teaching of reading is now at hand."[20]

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